Advanced Systems Engineering Environments

Follow-on to

NDIA Simulation-Based Acquisition Conference

"Enabling the 21st Century Acquisition Enterprise"

Held in Springfield VA

May 2001

Purpose

- NDIA Workshop “Acquisition in the 21st Century” was held in May 2001
  - **3rd DOD/NDIA Simulation Based Acquisition (SBA) Conference**
- Over 225 participants from industry, government and academia
- Organized around key areas which contribute to the effective use of simulation to support acquisition: “Enabler Classes”
  - **Integrated the range of relevant activities underway across the DOD from policy to technical standards to specific capability developments**
- A review of conference have led to a set of conclusions and recommendations
  - **Focus on need to strengthen systems engineering process and environments supported by robust simulation to meet the needs of today’s needs**

Simulation Based Acquisition (SBA)

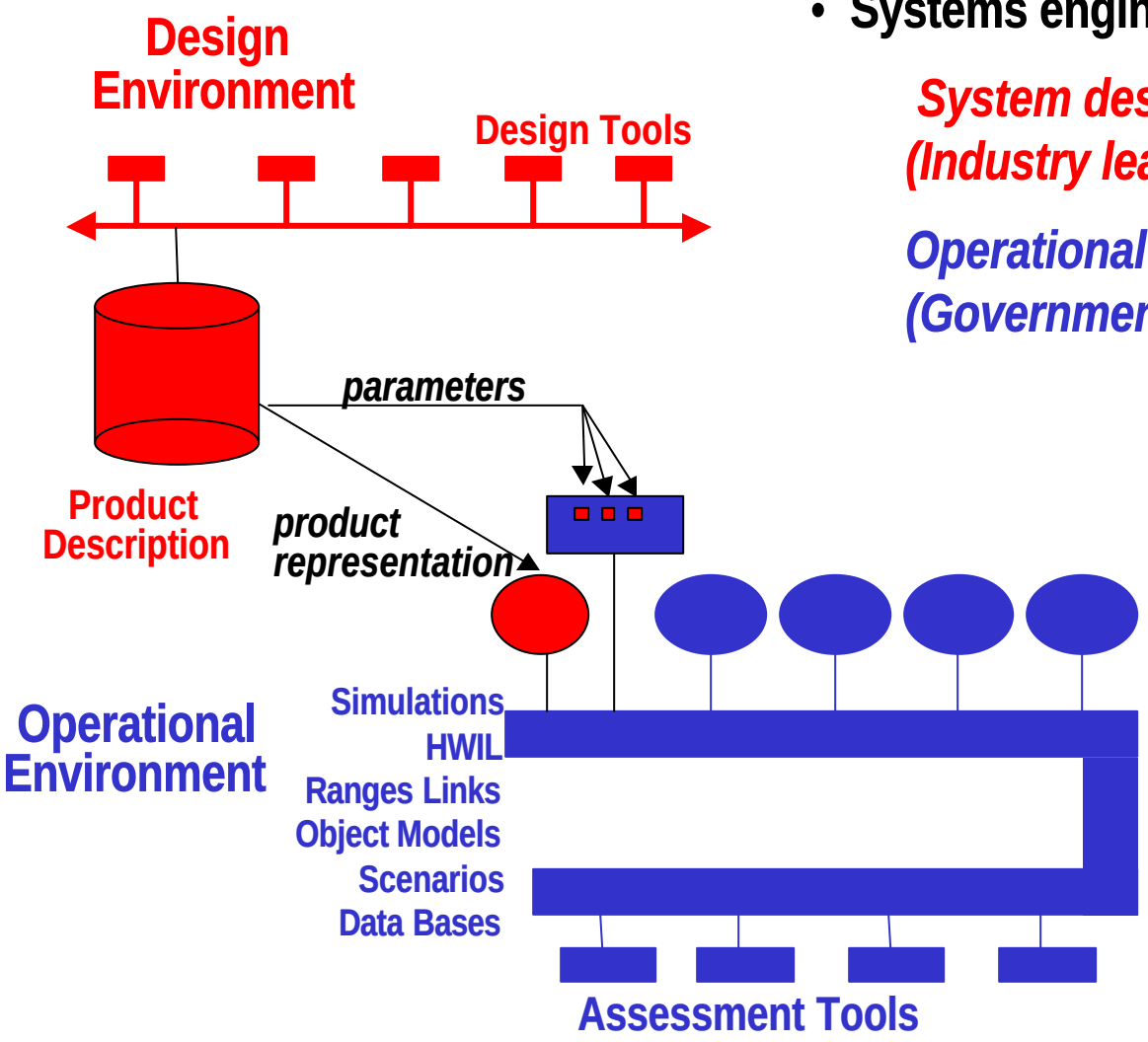
- SBA is
  - a strategy to apply simulation throughout the full life cycle of a given program and sharing these capabilities smartly across different programs
  - includes analysis, requirements, design, development, test and training

- Community Consensus on SBA Definition and Key Enablers
  - Industry and government have adopted a common written statement of SBA vision definition, and classes of enablers
  - Address broad set of issues -- policy, workforce training, technical standards, simulations, etc.

Substantial Progress in Selected Areas

- Progress has been made in applying selected SBA concepts in
  - Key programs, notably Joint Strike Fighter
  - New systems development, notably the Army Future Combat System
  - Critical mission areas, notably missile defense
  - Achievement of new missions, notably AF C2 integration
- In each case, a systems engineering environment with robust simulation support has been created
  - By the using activity (e.g. Program, System Developer)
  - To address the specific needs of the user
  - Addressing component reuse throughout life cycle of the using activity
  - Devoting little attention to reuse beyond this

Notional View of Simulation-Based Enabled SE Environment



- **Systems engineering environments include**
  - ***System design environments (Industry lead; government support)***
  - ***Operational environments (Government lead; industry support)***
- **Simulation supports both**
- **Need consistent strategy for**
  - **SE processes**
  - **Specifications**
    - *product descriptions*
    - *tool interfaces*
    - *etc.*
  - **Supporting capabilities**
    - *Scenarios/databases*
    - *System representations*
    - *etc.*

Limits to the Current Direction

- Progress has be made in creating simulation-enabled systems engineering approaches, it has been uneven, with little attention to system-wide issues
  - **Programs/Services are creating the systems engineering environments they need in a way that makes sense for their specific applications**
  - **Industry makes investments their customers require and those that give them a competitive advantage**
- However, ongoing developments will not 'work together' to create the needed leverage across systems throughout the lifecycle
- Many needed components are available from ongoing efforts, but
  - **They are nor designed to be reused across, there is duplication of efforts and there are missing elements, with no one willing to make investments alone**
- Without attention, there is no motivation to develop and implement a strategy to consistently create the needed systems engineering environments supported by robust simulation support

Industry View

- Industry sees value of aspects of SBA for themselves and for industry in partnership with government
- Industry is making investment in simulation supported systems engineering capabilities for their own use, in many cases to improve their individual competitive advantage
- The uneven, fragmented approach to development and implementation of systems engineering environments across the DOD poses real problems for industry
  - **Industry works across systems, Services, customers and industry alliances**
- Call for DOD to pull together to create consistent simulation-enabled systems engineering environments across Programs and Services

Challenge

- **A DOD-wide strategy for creating advanced simulation-based systems engineering environments**
- Building on the demonstrated and evolving experience
  - Substantial Service/Agency/Program efforts underway
  - Industry initiatives and investments
  - Commercial standards and tools
- Working with Services, Agencies and Industry, strategy which provides
  - Clear vision of advanced system engineering environments supporting the Department internally and with coalition partners
  - Progress and gaps toward meeting that vision
  - Steps needed to move forward, including resource requirements